

REMARKS

Claims 1, 4-7, 9-14, 16-18, 20-22 and 24-34 are pending. Of these, claims 1, 18, 22, 31 and 32 are independent.

By this reply, claims 2-3, 8, 15, 19 and 23 have been canceled without prejudice to or disclaimer of the subject matter contained therein

Rejection Under 35 U.S.C. §102

Beginning on page 2 of the Office Action, the Examiner has responded to Applicants' arguments. Then, beginning on page 4 of the Office Action, the rejection of claims 1-6, 11, 14-15, 18-20, 22-26 and 28-34 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,260,124 (the '124 patent) to Crockett et al. has been maintained. Applicants traverse.

To obtain information for automatically determining the status of a mirroring process, e.g., suspended, amended independent claim 1 recites:

requesting status information relating to the at least one
storage unit pair from mirroring software associated therewith; and
automatically updating the at least one status field of the
machine-actionable memory based upon the requested status information;
...

As will be explained below, these aspects (at the least) of claim 1 are not disclosed by the '124 patent.

As noted in Applicants' Background section (e.g., lines 35 et seq. of page 2), monitoring of disk pair status and the detection of an interruption in the mirroring process was typically done manually by a human administrator. Also, as noted in the previous response, the '124 patent is focused on what occurs after an error condition is resolved and after primary storage 104 and secondary storage 106 are readied to resume mirroring of primary storage 104 on secondary storage 106, e.g., resynchronization, normal updates, etc.

Applicants reiterate that there is almost no mention in the '124 patent of recognizing the existence of such error conditions. Lines 9-20 of column 7, which

contain the only discussion of recognizing error conditions, state (underlined emphasis added):

In the static resynchronization process 406, the data mover 114 detects an "error condition" (step 416). An error condition is a state of the system 100 preventing mirroring of data from primary to backup storage. For example, the error condition may involve failure or other unavailability of the backup storage 106 or controller 110, or failure occurring in the communications chain between the backup storage 106, data mover 114, and primary controller 108. If an error condition exists, steps are taken to resolve the error (step 418). This may involve a system administrator reconfiguring one or more components of the system 100, a technician repairing or replacing a failed component, or self-repair of the affected component. When the error has been resolved, re-enabling mirroring to the backup storage 106, the data mover 114 performs static resynchronization (step 420).

If the detection of an interruption in the mirroring process was typically done manually by the human administrator, then step 416 should be understood as nothing more than data mover 114 detecting that the human administrator has set a mirroring-interruption flag. Applicants wonder what about the '124 patent suggests (much less discloses) a presumption of anything other than a manual detection? Surely the Examiner is not interpreting the mere 10 out of 138 words in the above-quoted passage as suggesting something more than a manual detection.

On page 3 of the Office Action, the Examiner asserts that the '124 patent monitors error conditions that prevent proper or instant mirroring of data. To support the assertion, the Examiner directs Applicants' attention to lines 34-40 of col. 4, and lines 21-33 of col. 2. For convenience, those passages are reprinted below.

Lines 34-40, column 4 of '124 patent

As explained in detail below, if the backup storage 106 becomes unavailable for a period of time, the primary storage 104 continues to receive new data records while the backup storage 106 does not. This may occur, for example, if there is a failure of a component of the backup storage 106 or communications between the data mover 114 and the backup storage.

Lines 21-51, column 2 of '124 patent

In some cases, error conditions arise preventing proper mirroring of data from the primary site to the backup storage. These conditions include

failure of the backup storage, communications failure between the data mover and backup storage, etc. In these situations, the data mover stores any data records received by the storage system in the primary storage without mirroring the data records to the backup storage. The data mover also identifies the tracks that these data records are on in an update map.

When the error condition ends, the data mover performs a static resynchronization process, which begins by accessing the update map to identify a group of tracks containing new data records received during the error condition. The data mover reads these tracks, and then proceeds to write these read tracks to the backup storage. The data mover also makes an entry in a progress queue, this entry including (1) a group-ID identifying the tracks written to backup storage and (2) a read time-stamp ("RT") identifying the time when the data mover read these tracks from primary storage. The process of identifying, reading, and writing tracks continues until all tracks in the update have been processed.

Whenever the storage system receives new data records ("updates"), this invokes a dynamic resynchronization process. Advantageously, this process may occur simultaneously with the static resynchronization process, serving to accurately process updates despite ongoing static resynchronization. First, the dynamic resynchronization process determines whether the static resynchronization process is ongoing. If not, the updates are written to primary storage and the data mover mirrors the written updates to backup storage, as in normal circumstances.

The above-quoted lines 34-40 of column 4 and 21-50 of column 2 acknowledge that a failure might occur and give examples of causes for the failure. But neither passage addresses how the failure is detected.

The '124 patent barely mentions recognizing error conditions because that is tangential, at best, to the invention described in the '124 patent. There is no thought given in the '124 patent as to how the error conditions are recognized. It is no coincidence that every one of the six independent claims in the '124 patent includes the phrase "after termination of an error condition" as the first words following the transition word "comprising" separating the preamble from the claim-body. The '124 patent assumes that, somehow, the recognition could be made by a data mover 114, e.g., by recognizing that the human administrator has set the mirroring-interruption flag indicative of the human administrator having detected an interruption in mirroring.

In view of the discussion above, Applicants reiterates that a distinction over the '124 patent is automatically updating the at least one status field of the machine-actionable memory based upon the requested status information.

Another distinction of amended claim 1 over the '124 patent is automatically determining from the updated at least one status field whether the at least one storage unit pair is in a suspended condition. As noted, it might be reasonable to infer that the '124 teaches monitoring the status of a flag that indicates a mirroring-interruption condition. But it is reasonable to infer only that detection of the condition which the flag represents is done manually by the human administrator.

Under U.S. patent law, an aspect not literally disclosed by a reference is considered to be inherently present if the difference between what is literally disclosed and what is claimed necessarily follows from the literal disclosure. Here, it is unreasonable to assert that the above-discussed aspects of claim 1 necessarily follow from any statement of the '124 patent, especially from the following literal statement (in lines 9-20 of column 7) of the '124 patent:

In the static resynchronization process 406, the data mover 114 detects an "error condition" (step 416).

To that extent that the Examiner disagrees, Applicants again challenge the Examiner to present reasoning explaining how the above-discussed claimed aspects necessarily follow from what is literally disclosed by the '124 patent.

The '124 patent neither literally nor inherently discloses at least those aspects of claim 1 discussed above. Claims 4, 11 and 14 depend at least indirectly from claim 1, respectively, and similarly distinguish over the '124 patent by dependency.

Independent claims 18, 22, 31 and 32 recites a similar feature to that of claim 1 discussed above, and hence each similarly distinguishes over the '124 patent. Claims 20, 24-26, 28-30 and 33-34 depend at least indirectly from claims 18, 22 and 32, respectively, and similarly distinguish over the '124 patent by dependency.

Claims 2-3, 8, 15, 19 and 23 have been canceled by this reply, making their rejection moot.

In view of the foregoing discussion, Applicants request withdrawal of the §102 rejection over the '124 patent.

Allowable Subject Matter

Applicants acknowledge with appreciation that claims 7-10, 12-13, 16-17, 21, 27 remain indicated (on page 6 of the Office Action) as defining allowable subject matter (but for their respective dependence a rejected base claim).

CONCLUSION

The issues in the case are considered to be resolved. Accordingly, Applicants again request a Notice of Allowability.

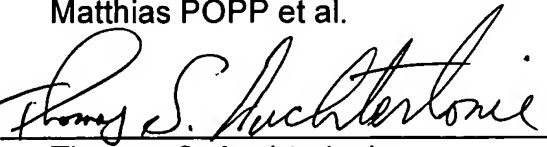
Person to Contact

In the event that any matters remain at issue in the application, the Examiner is invited to contact the undersigned at (703) 668-8000 in the Northern Virginia area, for the purpose of a telephonic interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-2025 for any additional fees under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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